REMARKS

The objections and rejections presented in the Office Action dated February 7, 2007, have been considered and are addressed below. Claims 1-33 are pending in the application. Reconsideration and allowance of the application are respectfully requested.

The drawings stand objected to under 37 C.F.R. §1.83(a) as allegedly not showing claimed limitations directed to a program controller, fitness evaluator and selector. Applicant submits that this objection is improper because the indicated limitations are shown in the figures and further thoroughly described in the specification in connection with various example embodiments. For example, FIG. 3 shows a system where an "evolution controller 320 sequentially loads designs into the programmable device, provides an identical data input and generates a result output for several designs. The result outputs from at least two of the designs are used to generate a consensus result, which is used to determine a fitness level of the designs" (see paragraph 0034). Referring again to FIG. 3, for some embodiments, the evolution controller 320 "replaces one of the unfit designs stored in the memory 330 with the newly-evolved design" (see paragraph 0033). This evolution controller 320 and the corresponding description describe one or more example embodiments that may be applicable to each of the above-referenced claimed limitations, including a program controller (*e.g.*, "loads designs into the programmable device"), fitness evaluator (*e.g.*, "generate a consensus result ...used to determine a fitness level") and selector (*e.g.*, "replaces one of the unfit designs ... with the newly-evolved design"). Referring to FIG. 1 and as another example for a fitness evaluator, the evolution controller 120 evaluates "the fitness of all designs" (*see, e.g.*, paragraph 0021). As a further example relevant to claim limitations directed to a selector, the aforesaid evolution controller 120 further selects a design based on the evaluation (*e.g.*, "the designs with the best agreement with the consensus result are considered the most fit and are retained, with less fit designs being eliminated" as described at paragraph 0022). In this regard, the drawings and specification show the referenced features or

the claimed invention as is consistent with 37 C.F.R. §1.83(a); Applicant therefore requests that the objection to the drawings be removed.

The Office Action's suggestion for revision to the specification is confusing, and its stated interpretation of specification (the cited portion of paragraph 0026) incorrectly suggests that language from the specification is contradictory. Specifically, the paragraph cited in the Office Action describes an approach involving an evaluation process that continues "[i]f there are no inconsistent result signals" (*i.e.*, when there is no failure). In other words, if there is no inconsistent result signal, the evaluation is continued to detect any errors or failures as indicated, for example, by inconsistent result signals. This continued evaluation may occur immediately, or in response to a triggering event that subsequently occurs, such as a failure condition; where a failure condition occurs, an evaluation can be useful, for example, in identifying an inconsistent design causing the failure. If the evaluation shows inconsistent results, a new evolved design is generated (*see, e.g.*, paragraph 0027). In this regard, the Office Action's interpretation of the specification is incorrect, and the suggestion that the specification should be revised is unfounded. Therefore, Applicant believes no amendment to the specification is necessary.

The objections to the claims under 37 CFR 1.75(c) are confusing, appear to ignore various discussions in the specification, and are therefore improper. Beginning with claim 20, the rejection "for failing to further limit the subject matter of a previous claim" is unfounded and contrary to the clear language in the claim. Specifically, the Office Action's contention that "programming and reprogramming has nothing to do with generating [a] result signal" is confusing and contrary to the specification and claims. For example, as described in connection with an embodiment relating to FIG. 4, designs are evaluated using an approach that includes programming a programmable device such as PLD 410 with a design, and reprogramming the PLD with a new design, with result signals generated for each design (*see, e.g.*, paragraph 0038). Therefore, objection to claim 20 should be removed.

The objection to claim 4 is misplaced because the suggested language is not required for claim 4 to properly depend from claim 3 (*i.e.*, the dependency is clear and consistent with relevant portions of the M.P.E.P. and supporting law). Specifically, claim 3 recites "weighting the result signal as a function of the associated fitness level," and claim 4 recites "wherein weighting the result signal as a function of the associated fitness level..." and thus includes word-for-word correspondence to the antecedent limitations. Further recitation to limitations "determined in a prior generation" is unnecessary for clarity. As the Office Action cites no support for the objection, it thus fails to show that the limitations are improper; Applicant therefore respectfully declines to make the suggested amendment and requests that the objection be removed.

The objection to claims 25-33 indicating that "the claim body does not support/suggest that it is a fault-tolerant system" is contrary to the claims' limitations and supporting specification. For instance, referring to claim 25, limitations are directed to selecting and replacing designs as a function of their fitness level. As described throughout the specification, this approach facilitates the toleration of faults such as those related to an unfit design or failure due to conditions such as temperature variation, age and radiation (*e.g.*, that may affect the operation of a particular design). As the Office Action cites no support for the objection and as the limitations are clearly supported in view of the above, Applicant respectfully declines to make the suggested amendment and requests that the objection be removed.

The rejections of claims 10, 12-13, 15-16, 18-19 and 25-33 are indefinite under 35 USC §112, second paragraph, are improper because the Office Action has not shown or alleged that the limitations would not be understood by one of skill in the art, and because the limitations are clear under Section 112 and relevant law. Applicant has attempted to address each rejection in the following, to assist the Examiner in understanding the plain language in the claims.

Regarding claim 10, the limitations are directed to determining a fitness level of a particular design as a function of a first difference (between a result signal of the particular design and consensus result), relative to a second difference (between

result signals of other designs and the consensus result). Applicant submits that this is not only consistent with the claim language, it is consistent with the Specification and as such, would be understood by one of skill in the art. The rejection of claim 10 is therefore improper.

Claim 12's dependency from claim 10 is proper because claim 10 depends from claim 1 and, therefore, the recitation in claim 12, to the limitations of claim 1, is proper. In this regard, claim 12 has proper dependency and the rejection thereof is improper.

Regarding claim 13, the specification describes various example embodiments supporting the claimed limitations directed to a relationship between an associated result signal and a consensus result. Such a relationship may, for example, involve the result signal being within a particular range of the consensus or grouping relative to results upon which the consensus is based (*see, e.g.*, paragraph 0026). One example embodiment may involve the difference as suggested in the Office Action (and, correspondingly, as apparently clear to the Examiner and one of skill in the art). In this regard, Applicant submits that the Office Action has not established that claim 13 is indefinite under Section 112(2) and the corresponding rejection is improper.

Regarding claim 15, the specification describes various examples as to bias and probability, relative to the selection of a design, therefore providing clear support for the claim. As is consistent with the Office Action's apparent understanding of claim 15, the claimed biasing may be effected, relative to probability, to increase the probability of eliminating less-fit designs (as is consistent with paragraph 0023) or for other probability functions (*see, e.g.*, paragraph 0033). In this regard, the Section 112(2) rejection of claim 15 is improper because the claimed limitations are clear in view of the specification and as would be understood by one of skill in the art (by way of example, as apparently understood by the Examiner as well).

The Section 112(2) rejection of claim 16 is improper for reasons as described above in connection with claim 10, as referring to similar limitations (a difference between a result signal and a consensus).

Regarding claim 18, each of the limitations relating to a trigger event or time is described in the specification. For example, as is consistent with the above

discussion in connection with the improper objection to the specification, paragraph [0026] describes various examples supporting this claimed subject matter. In this regard, the rejection of claim 18 is improper as well.

Regarding the limitations "configured and arranged" in claims 25-29, not only is this language commonly understood and used extensively in thousands of issued patents, the specification also provides specific support therefore. For example, in various embodiments, a controller is "arranged" as shown, for example, in figures 1, 3 and 4, coupled to program programmable devices and/or to receive outputs from the same and, consequently, to carry out the limitations as claimed. The rejections to claims 25-29 are therefore improper and should be removed.

Applicant traverses the rejection of claims 3, 13, 15, and 16 under 35 USC §112, first paragraph, because the "written description requirement does not require that the applicant "describe exactly the subject matter claimed." Union Oil Co. of California v. Atlantic Richfield Co., 208 F.3d 989 (Fed. Cir. 2000), cert. denied, 69 U.S.L.W. 3165 (Feb. 20, 2001) (No. 00-249) (quoting In re Gosteli, 872 F.2d 1008, 1012, (Fed. Cir. 1989) (citations omitted)). Instead, "the description must clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." Id. The following addresses each claim specifically, showing support in the specification as consistent with the above and the requirements of Section 112(1).

Regarding claim 3, various portions of the specification describe approaches to weighting involving designs that have fitness levels determined for iterative generations. For example, as indicated in paragraph 0022, weight is given to selected designs exhibiting robust fitness characteristics such as age (survival over time). In this regard, the specification provides clear support for these claimed limitations.

Regarding claims 13 and 16, as is consistent with the above discussion regarding the Section 112(2) rejections to these claims, the claimed limitations are generally directed to a relationship between a result signal and a consensus. Such a relationship may involve, for example, a difference between the result signal and a consensus, or the result signal being in a particular range, relative to the same (see, e.g., paragraph 0026 and other portions of the specification as discussed above).

Regarding claim 15, as is also consistent with the above discussion regarding the Section 112(2) rejection of claim 15, the specification describes various examples as to bias and probability, relative to the selection of a design. Here, and as is consistent with the Office Action's suggestion, the claimed biasing may be effected, relative to probability, to increase the probability of eliminating less-fit designs (as is consistent with paragraph 0023) or for other probability functions (*see, e.g.*, paragraph 0033).

In view of the above, the Section 112(1) rejections of claims 3, 13, 15 and 16 are improper and should be removed.

The Office Action failed to show that claims 1-33 are directed to non-statutory subject matter of 35 USC § 101. The rejection is respectfully traversed because the Office Action does not establish a *prima facie* case that the invention as a whole is directed solely to an abstract idea or to manipulation of abstract ideas or does not produce a useful result. Beginning with independent claim 1, a transformation or tangible result may include, for example, replacing a design used in operating a system with a new design that is used to operate a system relative to signals (*i.e.*, electrical) produced using the designs. As described at length in the specification, such replacement may involve programming (*i.e.*, storing data) for a programmable circuit such as an FPGA, with corresponding operation of the FPGA to operate the system. This data storage and design operation is a physical (electrical) change; the suggestion that the claimed method "merely manipulates data" ignores the physical and functional transformation of the operation of the system (*e.g.*, circuit) as claimed, in that the system is operated in accordance with the design. There is no "preliminary" process as suggested in the Office Action because the replacement of the design transforms the operation of the system and operation, for example, with a circuit such as an FPGA. The Office Action fails to address these and related limitations, and thus fails to establish a *prima facie* case under Section 101.

In a similar manner to that discussed above with independent claim 1, independent claim 21 is directed to limitations involving the use of (electronic) signals for (circuit) designs, and replacement of designs and corresponding re-programming and

physical transformation of the system as operated. In this regard, the Section 101 rejection of claim 21 is also improper.

Independent claim 25 is directed to a system including a programmable device, fitness evaluator and selector. The programmable device is reprogrammed with selected designs. This reprogramming effects an operational change of the programmable device, the passage of signals and other characteristics as is consistent with the specification. This reprogramming and related physical and operation change is useful for a variety of applications including with programmable circuits subject to radiation and other adverse conditions, which are readily described in the specification.

In view of the above, the Section 101 rejections are improper and should be removed.

The Section 102(e) rejection of claims 1-17 and 21-24 is traversed because the Office Action fails to show that the claims are anticipated by US patent publication 2003/0050902 to Buczak et al. ("Buczak") under 35 USC §102(e). As relevant to independent claims 1 and 21 and as applicable to the other rejected claims that depend therefrom, the Office Action fails to show how the "convergence criteria" in the Buczak reference correspond to the claimed consensus result, or that the fitness level of any design is determined as a function of a consensus result. For example, the Office Action does not cite any teaching or suggestion of Buczak's "convergence criteria" is a consensus result as claimed, or of the convergence criteria being used for determining the fitness of a design (e.g., by comparison as claimed). Rather, it appears that the convergence criteria is simply used as a point in a process of evolving and is determined independently from any actual value of the result signals. For example, as is consistent with paragraph 0047 in the Buczak reference, fitness criteria is predefined when used to set the convergence criteria, and in most instances, a number of generations or other generation-related occurrence is used as convergence criteria. Furthermore, Buczak's reliance upon any predefined fitness criteria requires that the predefined criteria be known or stored (e.g., in data storage) that is susceptible to failure; correspondingly, such reliance teaches away from claimed limitations directed to the determination of a consensus signal. In this regard,

the cited portions of the Buczak reference do not disclose limitations that correspond to the claimed limitations directed to a consensus result determined as a function of result signals, or used in determining fitness. Applicant has further reviewed the Buczak reference and cannot ascertain any teaching or suggestion that the convergence criteria corresponds to the claimed limitations directed to a consensus result determined as a function of generated result signals.

In addition to the above, the Section 102(e) rejection is further traversed because the Office Action improperly relies upon an unsupported inherency-based argument. Specifically, in an attempt to show correspondence to the claimed limitations, it appears that the Office Action is alleging that the claimed limitations directed to a consensus result inherently mean "an agreement has been reach[ed]" an somehow corresponds to Buczak's convergence data. Applicant submits that this inherency argument is unsupported by any citations from the prior art, and contrary to both the claimed limitations and the Buczak reference. As discussed above, the convergence data is not determined as a function of generated result signals, but rather is set relative to other criteria (see, e.g., paragraph 0047).

In view of the above, the Section 102(e) rejections of independent claims 1 and 21 are improper and should be removed. Applicant further submits that the rejections of claims 2-17 and 22-24, which depend from either claim 1 or 21, are accordingly also improper as the Buczak reference fails to correspond to limitations in each respective independent claim.

The Office Action fails to show that claims 25-28 and 30-33 are anticipated by SMC-IT 2003, July 13-1, 2003 "Evolvable Systems for Space Applications" to Lohn et al. ("Lohn") under 35 USC §102(a). The rejection is respectfully traversed because the Office Action fails to show that Lohn provides correspondence to all of the limitations. For example, as is consistent with the above discussion in the Section 102(e) rejection, the Office Action fails to show any correspondence to claimed limitations directed to determining a consensus result as a function of associated result signals from at least two designs. The Office Action further fails to show any correspondence in the Lohn reference to determining an associated fitness level of

each design as a function of the associated and consensus results. Here, the Office Action refers to Section 2.1 of the Lohn reference it its entirety as corresponding to these limitations, without citing any specific correspondence therein. Applicant has reviewed this section as well as other portions of the Lohr reference and cannot ascertain any correspondence to these limitations, or any discussion of a consensus result. Moreover, it appears that the Lohr reference relies upon externally-supplied parameters (see third paragraph, Section 2.1) in its fitness function, thus requiring some information or data that is external or separate to the system at hand (as does the Buczak approach described above). In this regard, the Office Action has failed to show correspondence to the limitations in independent claim 25, and therefore to claims 26-28 and 30-33, which depend therefrom. Applicant therefore requests that the Section 102(a) rejections be removed.

The Office Action does not establish that claim 29 is unpatentable under 35 USC §103(a) over Lohn and "official notice." The rejection is respectfully traversed because the Office Action fails to show that all the limitations are suggested by the references, fails to provide a proper motivation for modifying the teachings of Lohn with teachings asserted via "official notice," and fails to show that the combination could be made with a reasonable likelihood of success. As is consistent with the above discussion, the Office Action fails to show correspondence to all of the limitations in claim 25; in this regard, the Section 103 rejection also fails to show teaching or suggestion of all of the limitations in claim 29, which depends from claim 25. The Office Action has also failed to allege correspondence, cited or via Official Notice, to limitations directed to sequentially programming with designs to generate associated result signals used as in claim 25, from which claim 29 depends.

Moreover, the Office Action has not shown how the sequential programming of FPGAs as described in Section 3 of the Lohn reference could function, where intra-cell routing is used as part of the evolution (*see, e.g.,* the introductory paragraph in Section 3). For instance, it appears that Lohn relies upon a combination of four configurable logic blocks (CLBs), as described in Section 3.1; in this regard, it is unclear as to how the Lohn reference could function with the suggested sequential

programming of CLBs. The Office Action therefore has not established a reasonable likelihood of success in modifying Lohn as suggested.

Regarding the Office Action's indicated "Official Notice," Applicant respectfully requests evidence in support of the proposition that such teaching is well known in the prior art and that there is adequate evidence of motivation to combine this prior art with the main reference, as is consistent with MPEP § 2144.03. Without such evidence, the Section 103 rejection cannot be maintained.

In view of the above, the Section 103(a) rejection of claim 29 is improper and should be removed.

CONCLUSION

Reconsideration and a notice of allowance are respectfully requested in view of the Amendments and Remarks presented above. If the Examiner has any questions or concerns, a telephone call to the undersigned is invited.
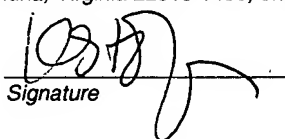
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on May 2, 2007.

__Katherine Stofer__
Name

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Signature